

**Data Gaps, Conceptual Remedial Design/Remedial Action Workplan
at Sites SD-10 and LF-13**



**Final Conceptual Design Work Plan for
Site LF-13 (Site 13) Remedial Action**

**CDRLs A001E, A008, A009, A010, and A011
Paragraphs 7.1.1, 7.1.2, 7.2, and 9.7.8**

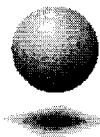
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SECTION 1.0

Introduction

This Conceptual Design Work Plan (Work Plan) for Site LF-13 (Site 13) at Beale Air Force Base (AFB or Base) presents the conceptual level remedial design for the remedial actions selected for Site 13 in the *Draft Record of Decision for Sites 10 and 13* (Draft Final ROD) (CH2M HILL, 2003c). The selected remedial actions include a soil cover for the former Landfill No. 1 and three remote areas (the former photo waste injection wells), enhancements to the groundwater treatability test system (GTTS), and land use controls (LUC).

This Work Plan was developed under the Air Force Center for Environmental Excellence (AFCEE), Contract No. F41642-03-D-8595, Task Order No. 0066 (BAEY 2003-7013 [Site LF-13]).

1.1 Purpose and Scope

This Work Plan presents a conceptual-level design for the selected remedy for Site 13. The Work Plan presents the results of hydrogeologic monitoring and groundwater flow modeling, provides a conceptual design for the soil cover for the landfill and three remote areas along the former industrial waste pipeline, and provides a conceptual level design of the GTTS enhancements proposed by this Work Plan.

1.2 Organization of Report

The Work Plan is divided into the following sections:

- **Section 1.0 – Introduction.** Presents the purpose, scope, and history of the Site 13 and the conclusions of the remedial investigation/feasibility study process.
- **Section 2.0 – Soil Remedy Basis of Design.** Presents the conceptual design for the soil cover for the landfill and the three remote areas.
- **Section 3.0 – Design of Enhancements to Groundwater Remediation System.** Presents the recommended enhancements to the existing pump and treat system. This section also summarizes groundwater flow modeling conclusions.
- **Section 4.0 – Works Cited.** Lists reference material used in preparation of this Work Plan.

This Work Plan includes the following appendices:

- Appendix A – Hydrogeologic Monitoring Results
- Appendix B – Request for a Biological Opinion
- Appendix C – Groundwater Model
- Appendix D – Cost Estimate

- Appendix E – Design Specifications
- Appendix F – Design Drawings
- Appendix G – Construction Quality Assurance Plan Soil Cover Construction
- Appendix H – Analytical Results for Stockpiled Soil
- Appendix I – Response to Comments: Draft Conceptual Design Work Plan for Site LF-13 (Site 13) Remedial Action

1.3 Site Background

Site 13 is located in the southwestern corner of Beale AFB west of the wastewater treatment plant (see Figure 1-1 [located at the end of this section]). Site 13 encompasses former Landfill No. 1, which operated from approximately 1942 to the mid-1950s. Wastes were typically disposed of in trenches or pits, and no cap currently exists over the landfill. Subsidence of the existing landfill cover has occurred in the northwest corner of Site 13, resulting in the formation of 0.462 acre of seasonal wetlands (see Figure B-3 in Appendix B).

The Site 13 investigation area includes Site WP-02 (Site 2), the former photographic wastewater treatment plant, which is located northeast of Site 13. Site 2 consisted of several facilities used for transport, treatment, and disposal of wastewater from the photographic laboratory. These facilities included two unlined sludge ponds, sand and limestone filters, filter surge tanks, and a wastewater disposal pipeline. One sludge pond had a capacity of approximately 1,200 cubic yards, and the other had a capacity of approximately 2,500 cubic yards. The treated-effluent pipeline was above ground and delivered wastewater from the photographic wastewater treatment plant to three injection wells. The sludge pond-affected soil and three remote areas of soil impacted by the former photographic waste pipeline are shown on Figure 1-1.

Portions of Site DP-19 (Site 19) are also included in the Site 13 investigation area. Site 19 consisted of components associated with the collection, transport, and treatment of the photographic waste.

Of these facilities included in Site 19, only the former treatment facility is included as part of Site 13, because of its proximity to the Site 13 landfill and associated contamination (Figure 1-1).

Site WP-20 (Site 20) and Area of Concern (AOC) 26 also exist within the Site 13 investigation area and are included in Site 13 for this Work Plan. Site 20, located northwest of the wastewater treatment plant, was an unlined grease pit or trench constructed in 1974. AOC 26 consists of two former World War II disposal areas located southwest and northeast of the wastewater treatment plant.

Groundwater near Site 13 occurs in alluvial deposits of (in order of increasing depth and age) the Laguna, Riverbank, Modesto, Neroly, and Mehrten Formations (Law Environmental, Inc. [LAW], 1997). Fine-grained marine sedimentary rocks of the Capay Formation and metavolcanic rocks of the Sierra Nevada Basement Complex underlie the Mehrten Formation. Total thickness of sedimentary deposits at Site 13 exceeds 1,100 feet.

The Laguna, Riverbank, and Modesto Formations consist of sand, silt, and clay with minor amounts of siliceous gravel. The combined thickness of these formations is about 100 to 200 feet. The Neroly Formation is approximately 350 feet thick and consists primarily of volcanoclastic gravel, tuffaceous sand, and minor silt and clay. A 70-foot-thick low-permeability sequence of clay, claystone, silt, and fine-grained sands occurs in the center of the Neroly Formation. This low-permeability zone acts as a confining layer. Cemented mudflows and volcanic breccias characterize the Mehrten Formation. The mudflow and tuff layers are well indurated and have low permeabilities. The Capay Formation underlies the Mehrten Formation and consists of approximately 600 feet of sandy silt and minor amounts of clay that were deposited in a marine environment (LAW, 1997).

An existing groundwater pump and treat system is currently treating groundwater contamination at Site 13. An active soil vapor extraction (SVE) system (Site 13 West) is currently operating to remove contaminants from the vadose zone. The Site 13 East SVE system was decommissioned in 2003 after its cleanup objectives had been met.

1.4 Future Land Use

The U.S. Air Force intends to use the Site 13 investigation area for industrial activities. The offbase portion of the Site 13 investigation area is currently used for agriculture and residential uses. This is the future land use applied in the design of offbase groundwater remediation.

1.5 Summary of the Selected Remedy

This section describes the remedial actions selected in the Draft Final ROD (CH2M HILL, 2003c). The four components of the complete selected remedy include the following:

- Landfill Soils – Soil Cover and SVE
- Pipeline Soils – Soil Cover
- Sludge Pond Soils – LUCs
- Groundwater – Existing Pump and Treat System Enhancements

1.5.1 Landfill Soils – Soil Cover and SVE

Approximately 8 acres, including the former landfill and an adjacent area of apparent subsidence, will be covered in place with clean soil. The soil cover will be designed so that at least 4 feet of clean soil will be placed above the existing landfill surface. The depth of the soil cover is intended to prevent contact of humans and wildlife with contaminated soil and prevent potential impacts to groundwater. LUC will be put in place to protect the integrity of the soil cover, prohibit residential use and limit access of unauthorized people into the area of soil contamination. Signs will be posted around the area of contaminated soil. Section 2.0 describes additional LUCs.

The Site 13 West SVE system will continue to operate to remediate subsurface volatile organic carbons (VOC) and total petroleum hydrocarbon (TPH) contamination. The Site 13 East SVE system has been shut down after having remediated the VOC contamination in the soil vapor in this area. Field monitoring will be performed at Site 13 East to evaluate the

effectiveness of monitored natural attenuation (MNA) of residual TPH contamination. Monitoring includes measuring concentrations of oxygen, carbon dioxide, and total VOCs in the soil gas.

1.5.2 Pipeline Soils (Remote Area Nos. 1, 2, and 3) – Soil Cover

Approximately 0.7 acre of dioxin contaminated soil will be covered to limit direct contact of human and ecological receptors. This soil is located in three remote areas along the former photographic waste pipeline (Figure 1-1). The depth of the soil cover will be 2 feet. The soil cover will be vegetated to limit erosion. Signs will be posted around the perimeter of the area to provide notice of the hazards present. However, because soil cover reduces the risk to humans of direct contact exposure, access would not be restricted and fences would not be installed.

1.5.3 Sludge Pond Soils – Land Use Controls

Dioxin-contaminated soil that poses an unacceptable risk to human health under the industrial exposure scenario is located under the former unlined sludge ponds of the former photographic wastewater treatment plant. Contaminated soil is located at the bottom of the excavation trench, under approximately 8 feet of clean backfill. Therefore, the proposed action for sludge pond soils is limited to LUCs to prohibit residential use and invasive activities such as excavation, grading, and trenching. Access will not need to be limited; therefore, no fences will be installed. However, markers will be placed to delineate the extent of contamination. Based on the depth of contamination, there are no risks to wildlife.

1.5.4 Groundwater – Existing Pump and Treat System Enhancements

The existing pump and treat system consists of 18 groundwater extraction wells that are connected to two air strippers via underground piping. Groundwater is currently extracted from 12 of the 18 extraction wells and pumped to the air strippers. An aboveground booster pump provides additional head to move the extracted water to the top of both air strippers. Air strippers remove trichloroethylene (TCE) and other VOCs and exhaust these contaminants to the atmosphere. The effluent from the strippers is pumped to the aeration basin of the wastewater treatment plant aeration pond.

Beale AFB will continue pump and treat at Site 13 with enhancements to ensure the achievement of remedial action objective. The specific enhancements to the pump and treat system have been selected in this report based on a review of the existing system performance, an evaluation of the need for enhancements, and groundwater modeling results.

The enhancements to the GTTS include the following:

- Abandoning 11 shallow wells
- Extending 22 monitoring and extraction wells
- Adding 2 extraction and 12 monitoring wells
- Adding new central control building
- Adding a new central control panel and interface system
- Moving SVE system off of the former landfill
- Rerouting and increasing size of piping conveying water to the air strippers
- Increasing the capacity of the electrical power distribution system to certain wells